

# STRUCTURAL ASSESSMENT OF SEABROOK STATION

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## Findings and Structural Testing Plan

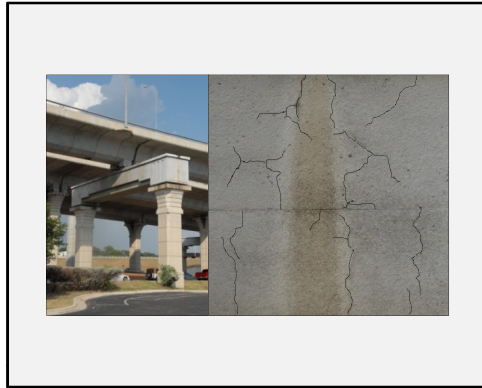


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Ferguson Structural Engineering Laboratory  
The University of Texas at Austin

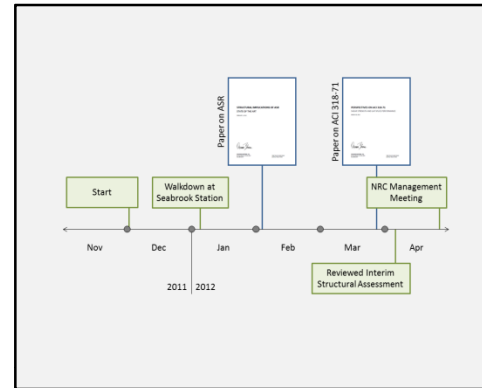
April 23, 2012

# AGENDA

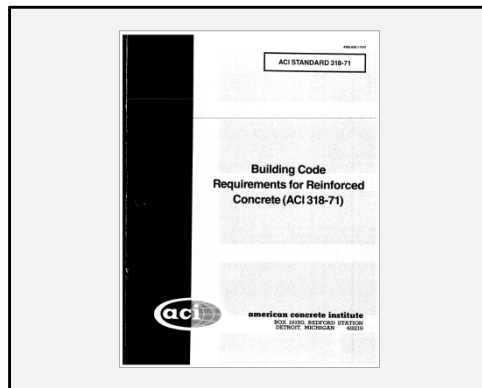
## KNOWLEDGE BASE



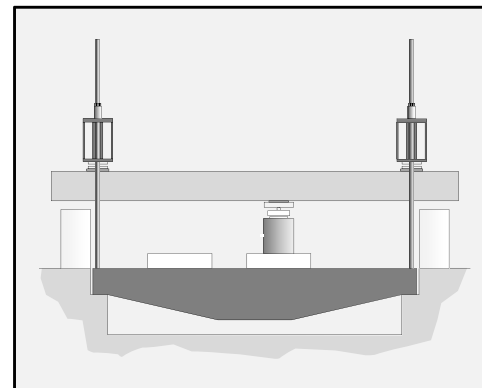
## INVOLVEMENT TO DATE



## INTERIM ASSESSMENT



## STRUCTURAL TESTING



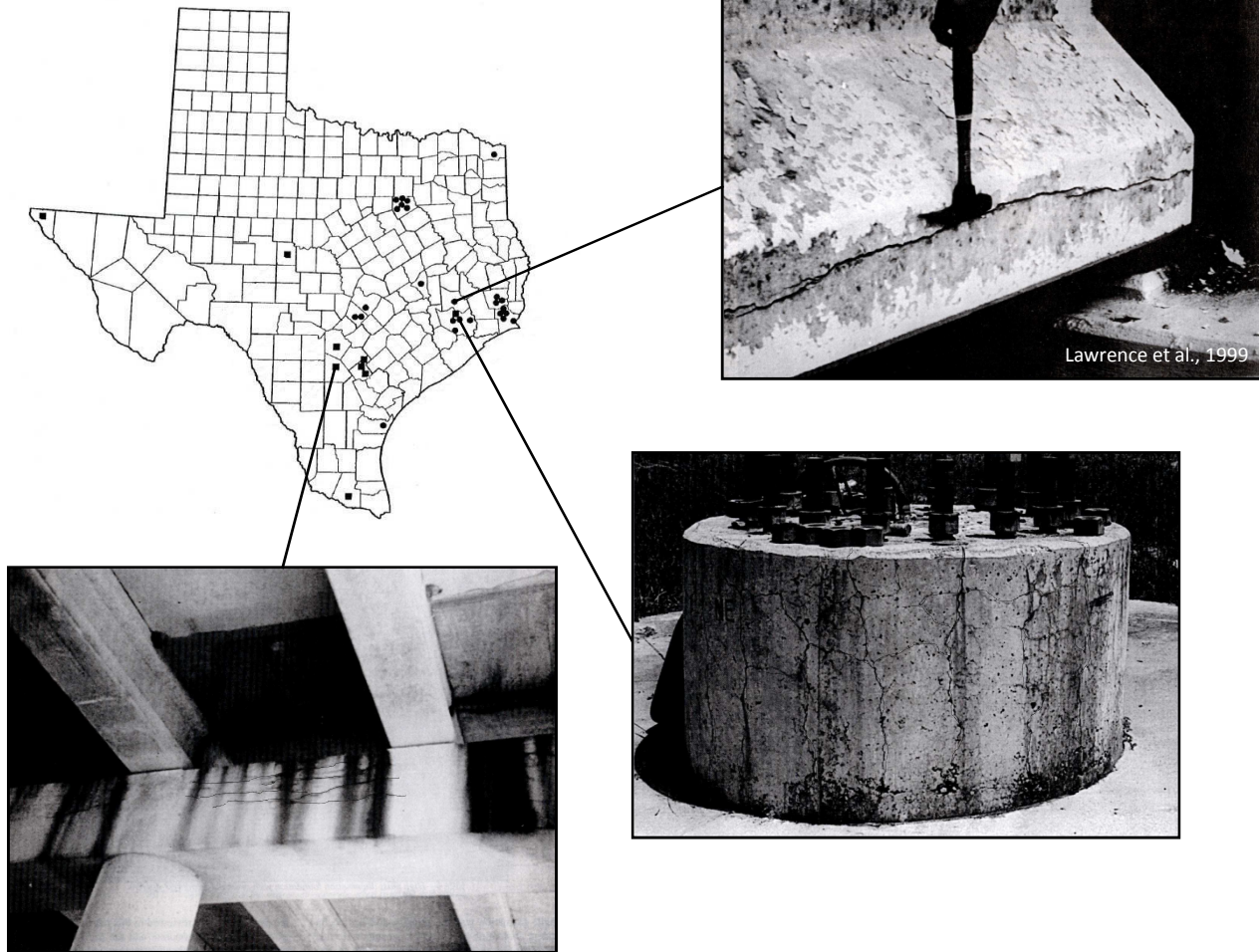
**KNOWLEDGE BASE**

## OGUZHAN BAYRAK, Ph.D., P.E.

- Investigations into the effects of ASR in highway structures were initiated in 2005
- Effects of ASR on multiple aspects of structural behavior have been evaluated through large-scale laboratory testing
- Critical insights gained from laboratory testing results and international literature



# ASR IN THE STATE OF TEXAS



# LARGE-SCALE EXPERIMENTAL RESEARCH



Flexure and Shear Behavior



Anchor Bolt Behavior



Dapped End Behavior

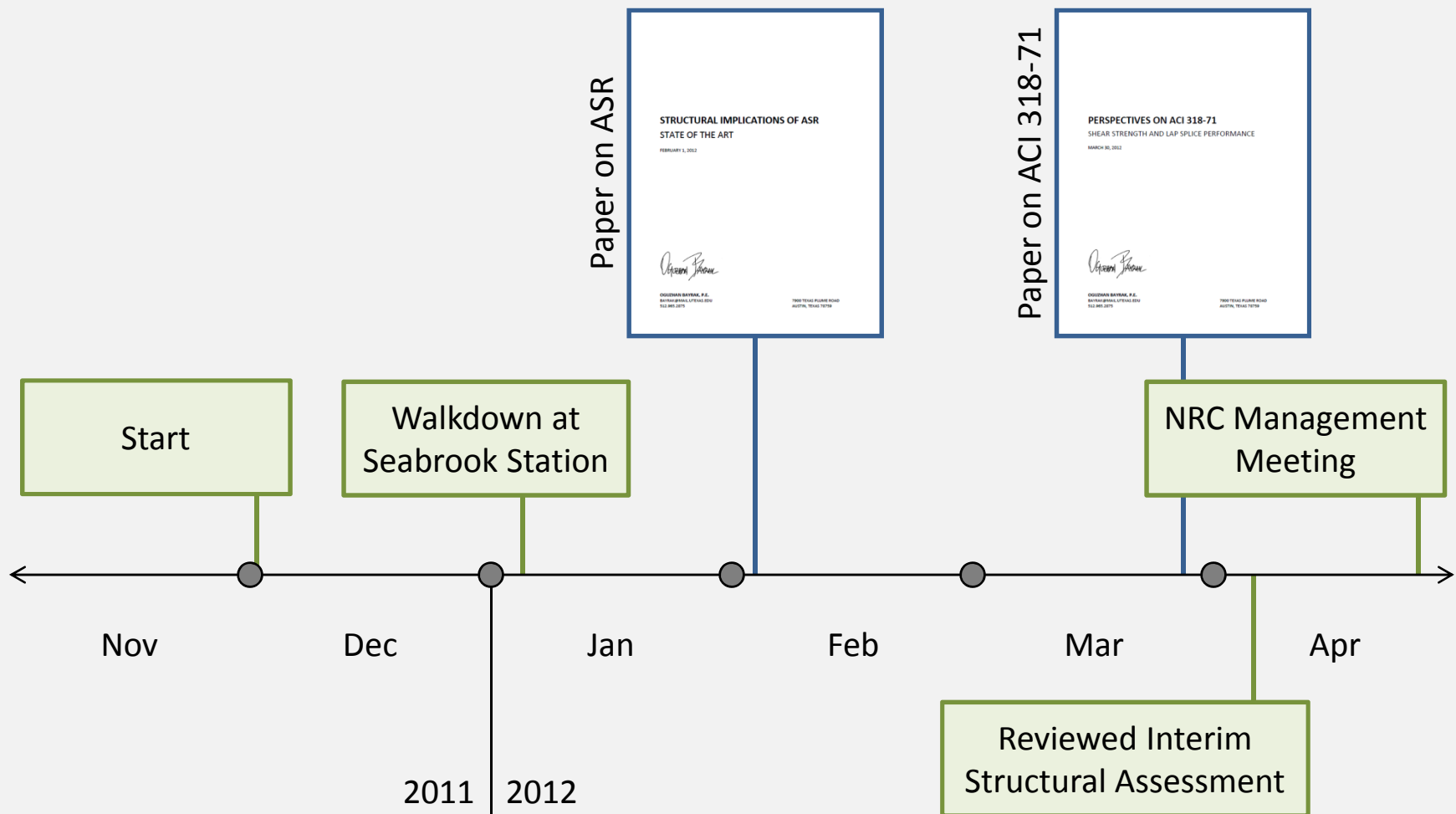


# FERGUSON STRUCTURAL ENGINEERING LABORATORY

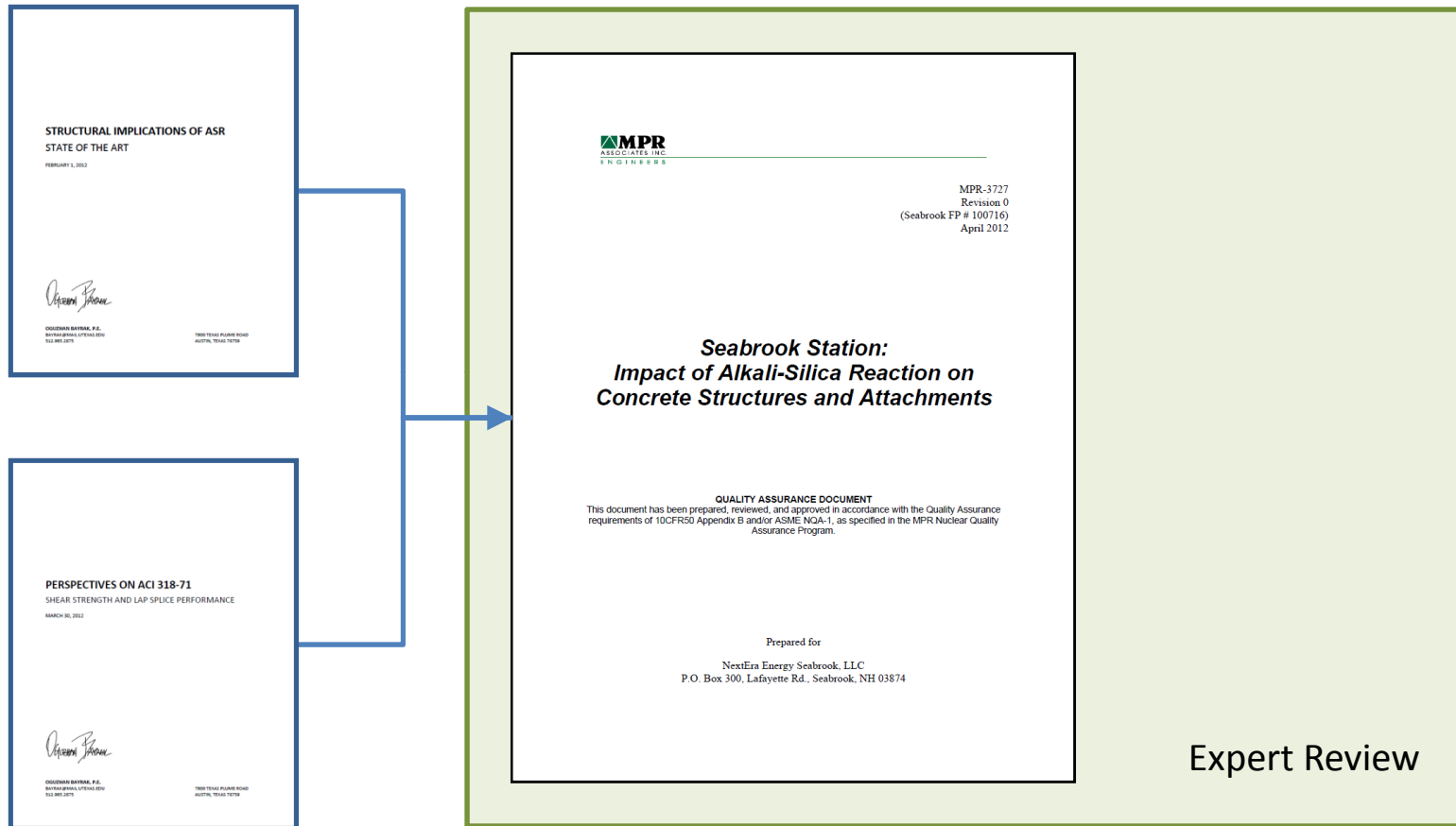


# INVOLVEMENT TO DATE

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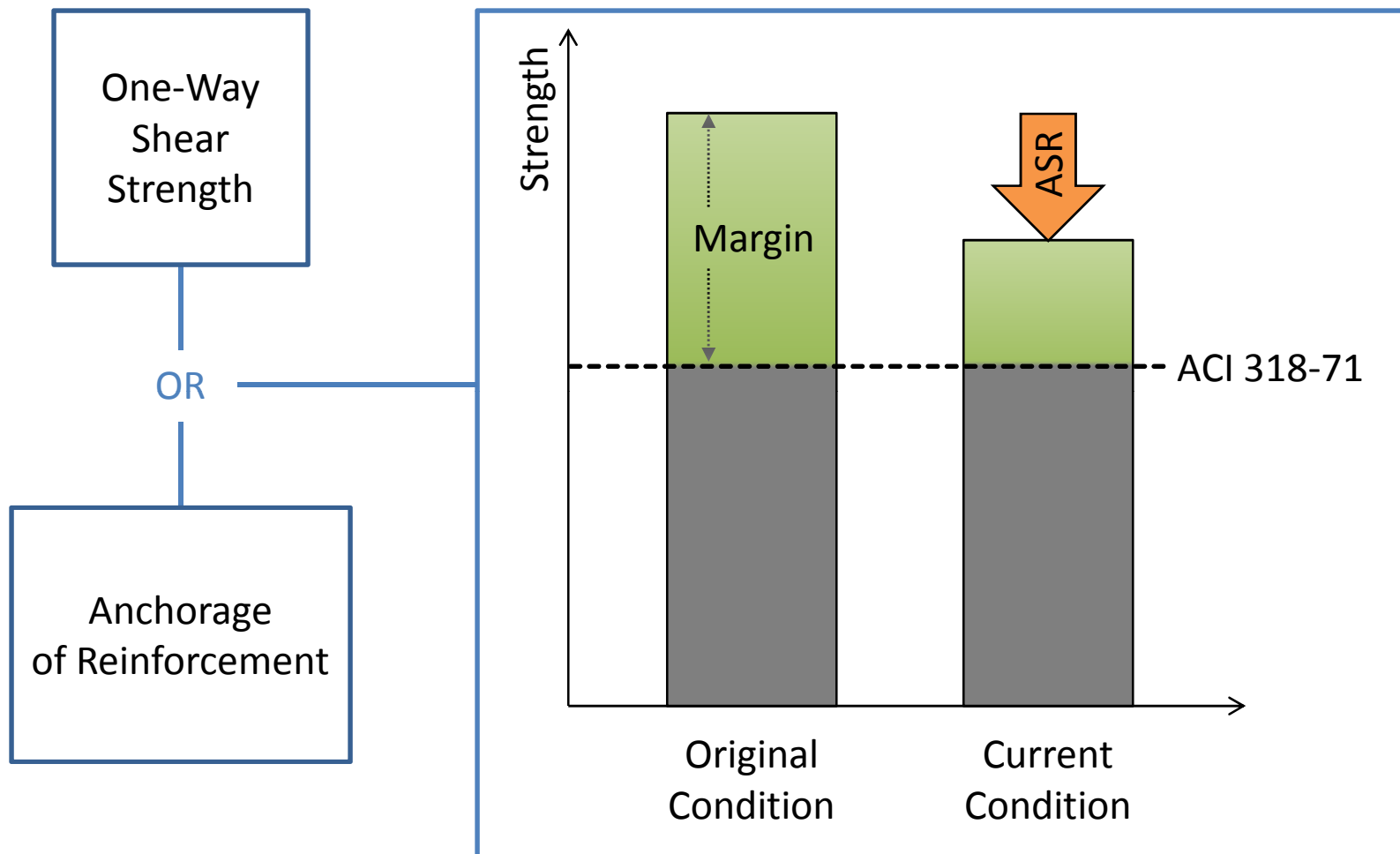


# INTERIM STRUCTURAL ASSESSMENT



# INTERIM ASSESSMENT

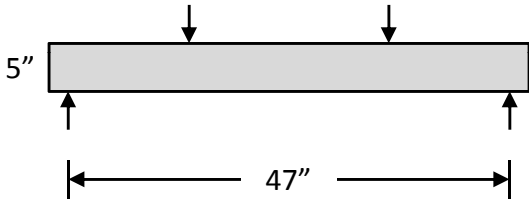
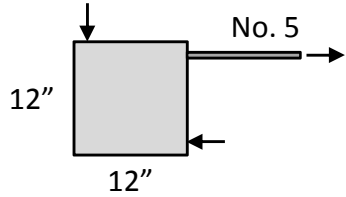
# INTERIM ASSESSMENT





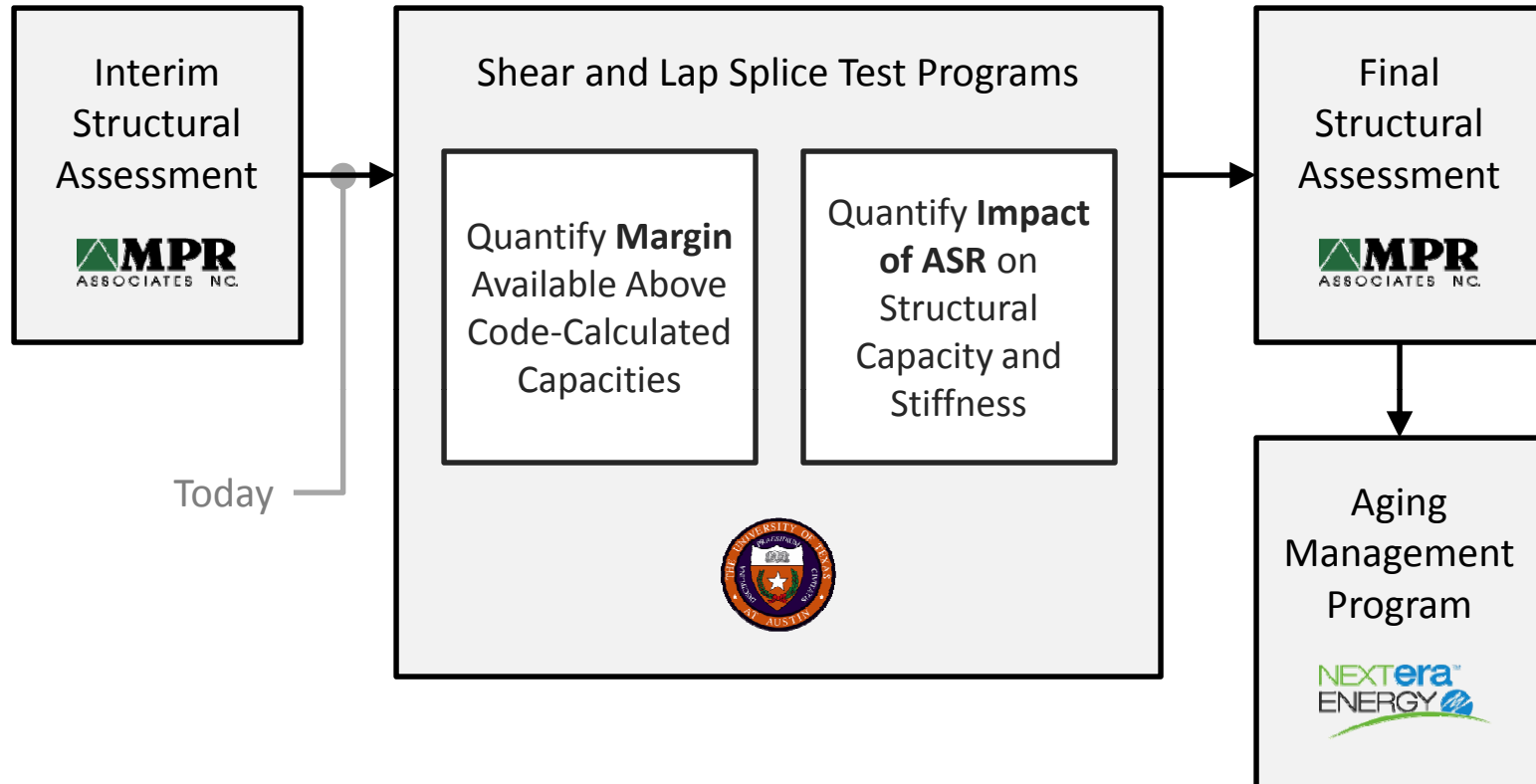
# INTERIM ASSESSMENT

Performance of large ASR-affected structures is not well represented by current test data set.

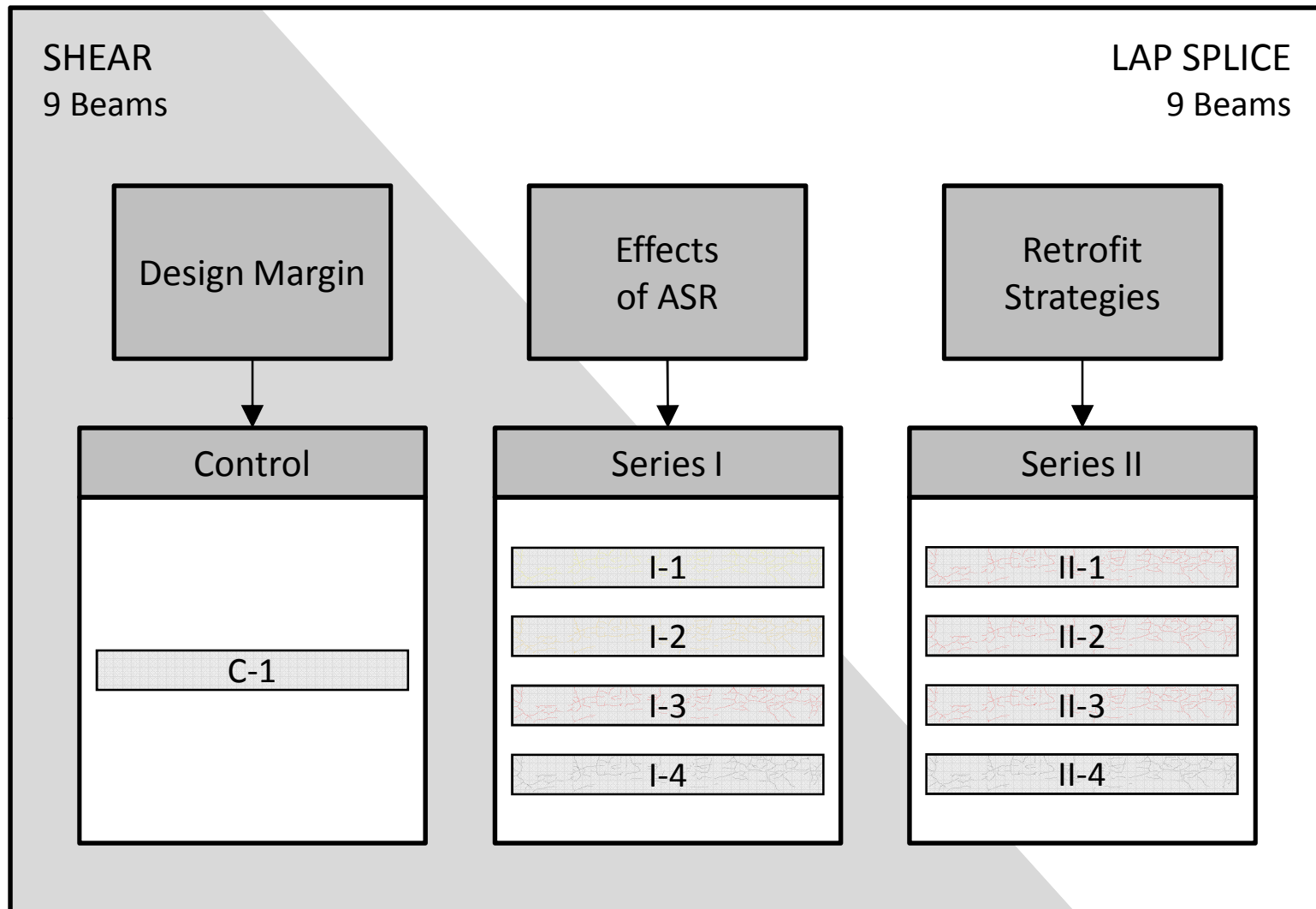
Limit State	Lower-Bound Reference	Specimen Scale
One-Way Shear without Transverse Reinforcement	Ahmed et al., 1998	
Reinforcement Anchorage without Transverse Reinforcement	Chana, 1989	

# STRUCTURAL TESTING

# METHODOLOGY



# TEST PROGRAMS



# REPLICATION OF SEABROOK DETAILS

The reinforcement detailing will:

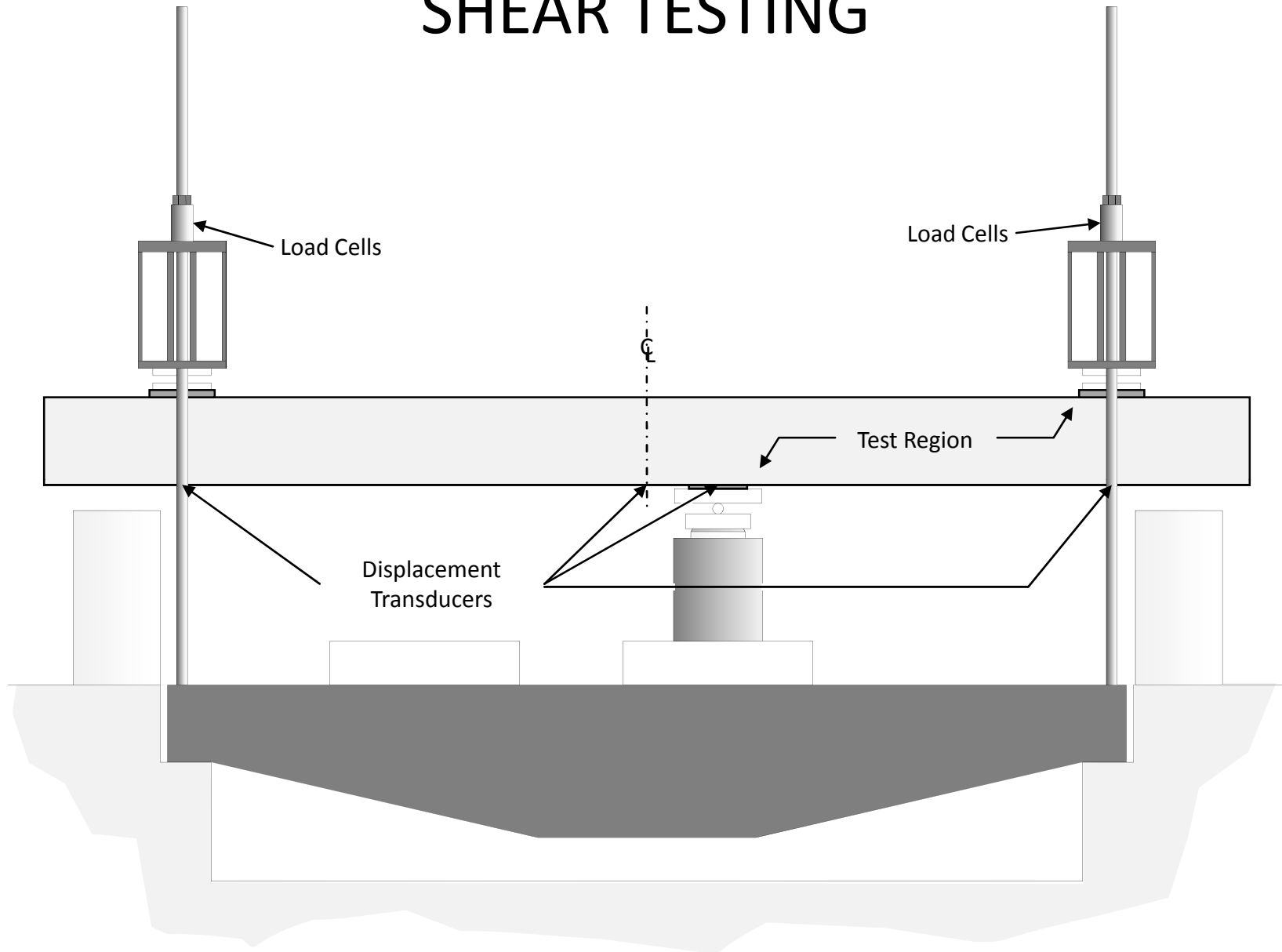
- represent the lack of through-thickness reinforcement within tunnel walls
- enable focused study of shear and anchorage behavior at current and future levels of ASR degradation

# REPLICATION OF SEABROOK DETAILS

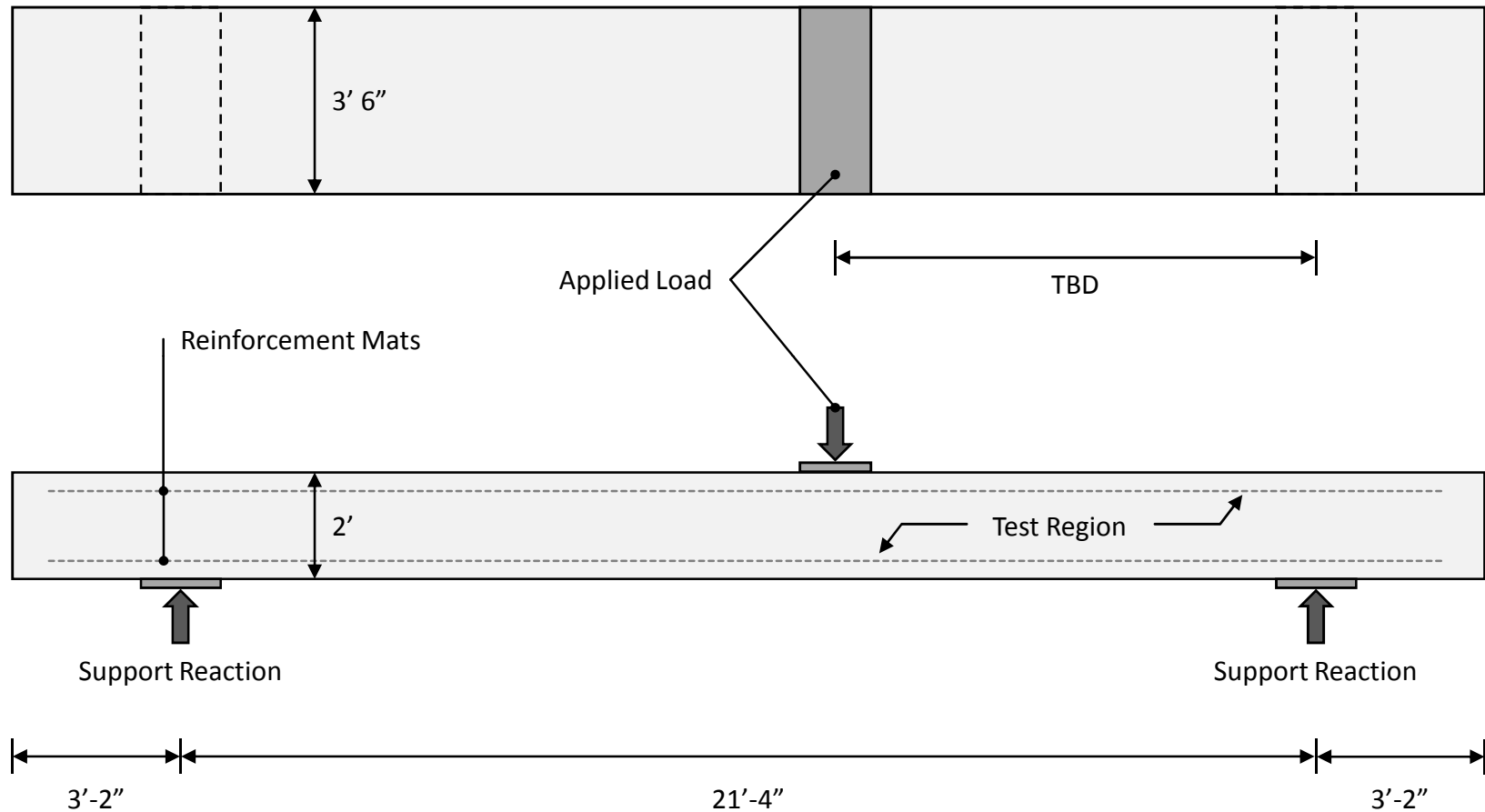
The concrete mixture will:

- be developed through trial batching with representative coarse and fine aggregates
- be sufficiently reactive to obtain the necessary data in a timely manner
- develop mechanical properties that are representative of Seabrook structures

# SHEAR TESTING

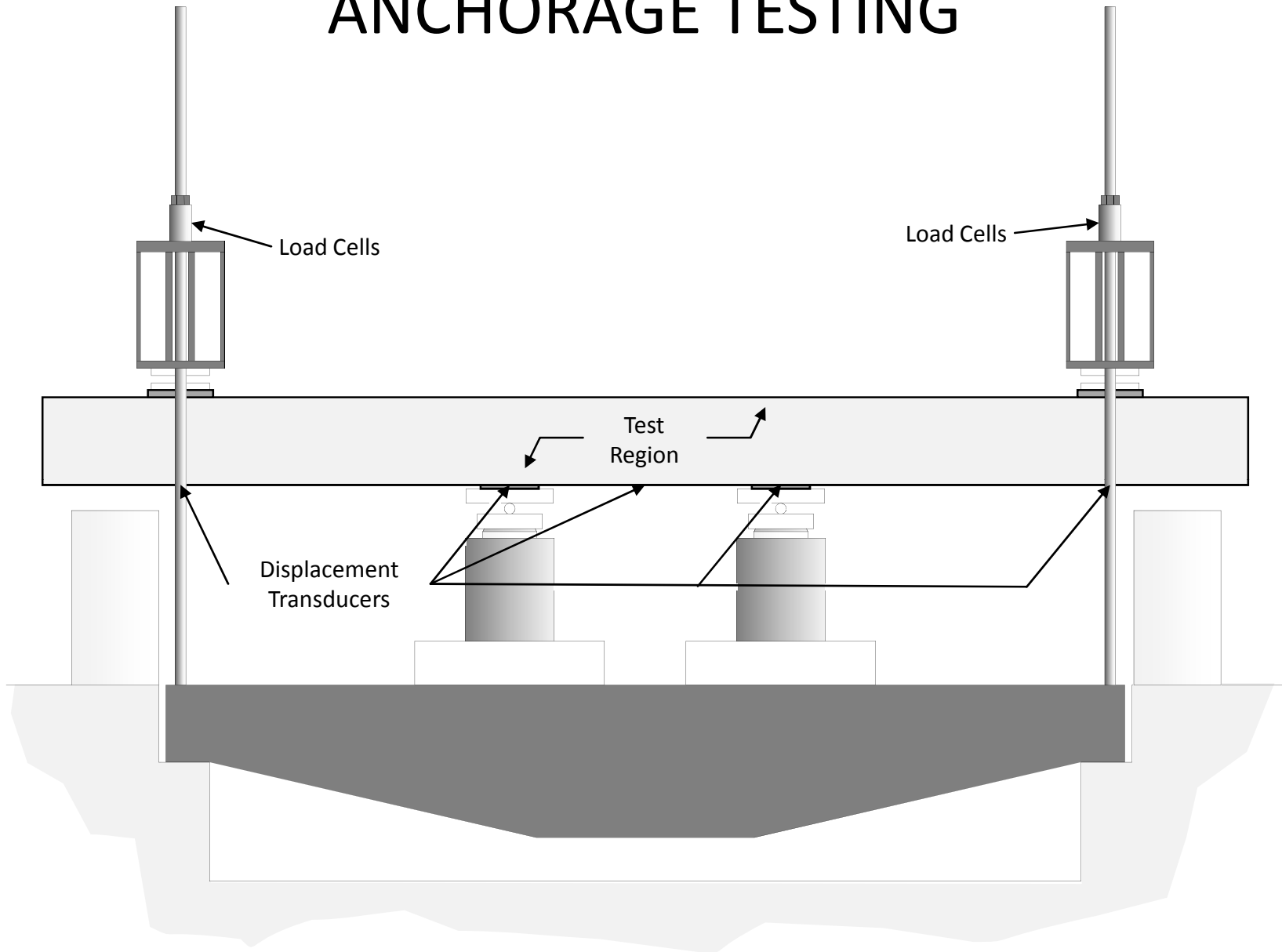


# SHEAR TESTING

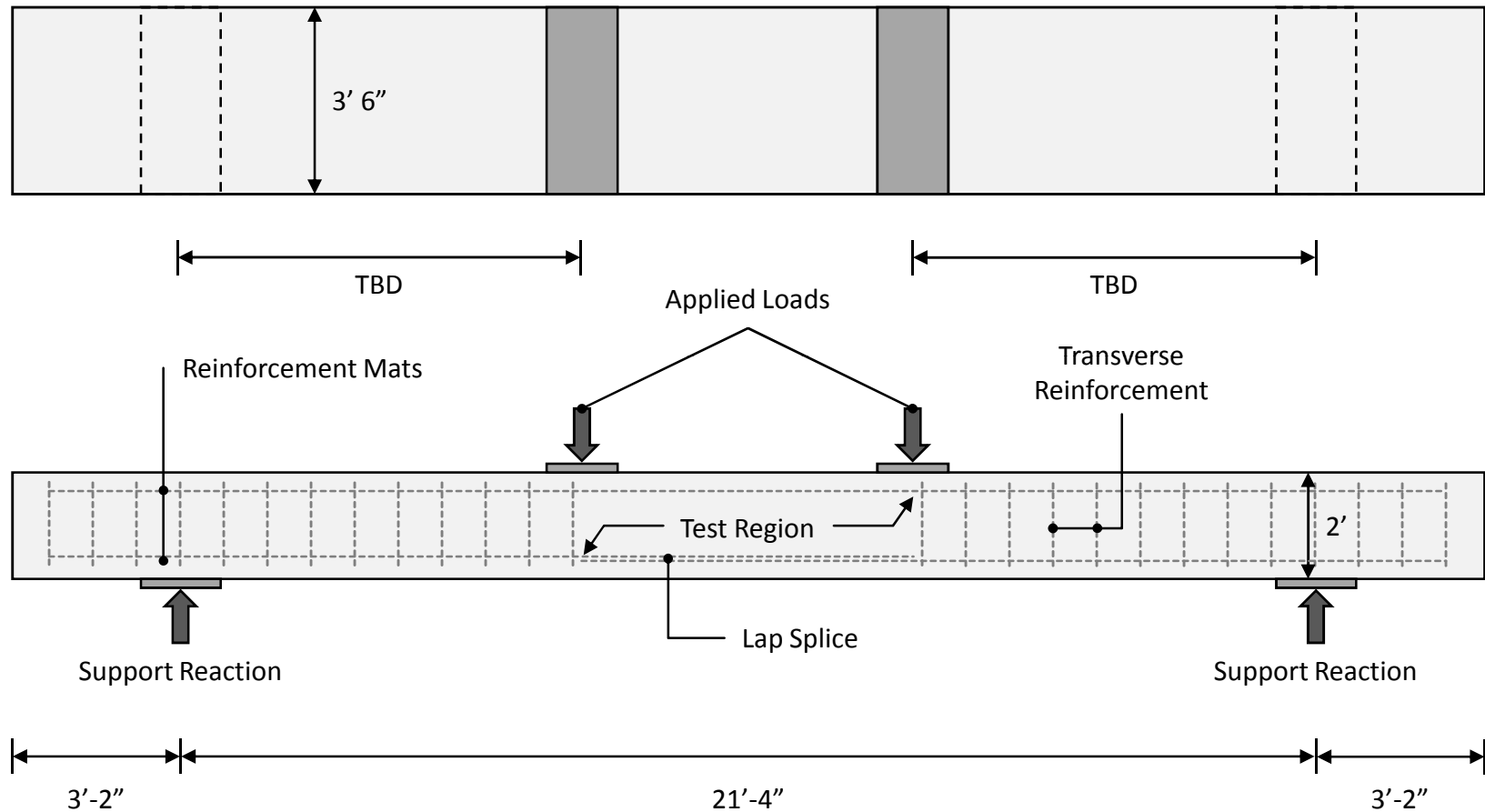




# ANCHORAGE TESTING



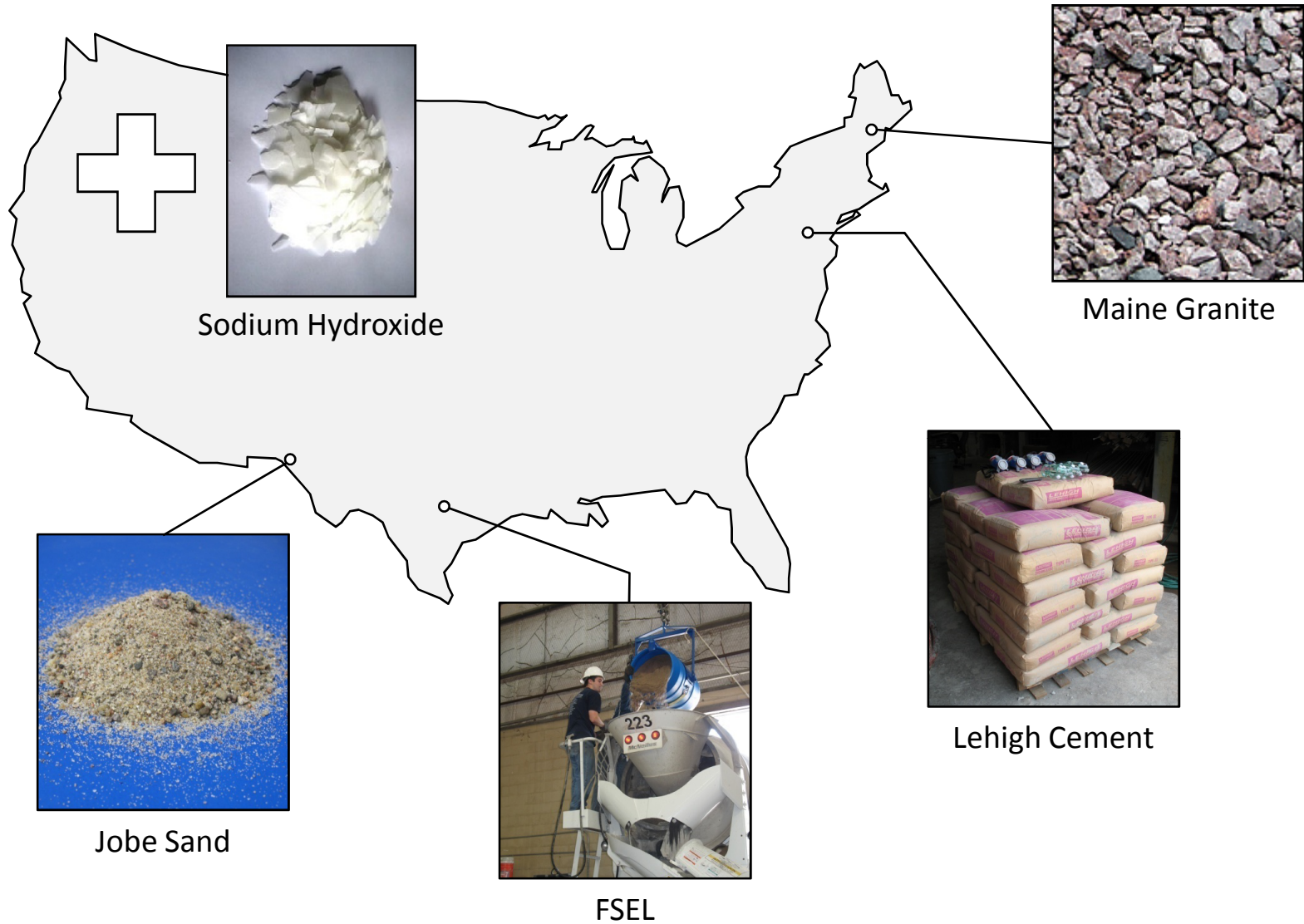
# ANCHORAGE TESTING



# PROJECT WORKFLOW



# CONCRETE MIXTURE



# BEAM FABRICATION





# CONDITIONING

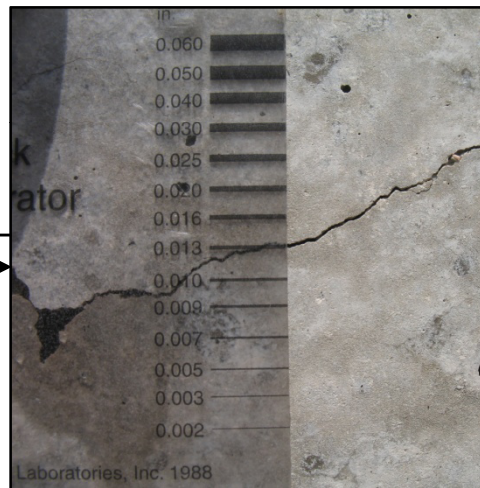


# EXPANSION MONITORING

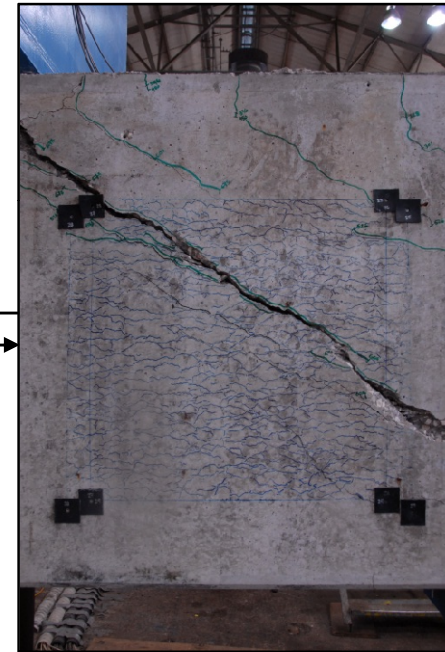
Cracking indices will be correlated to measured expansions as well as structural test results for use in Seabrook Station.



Expansions



Cracking Indices



Structural Performance

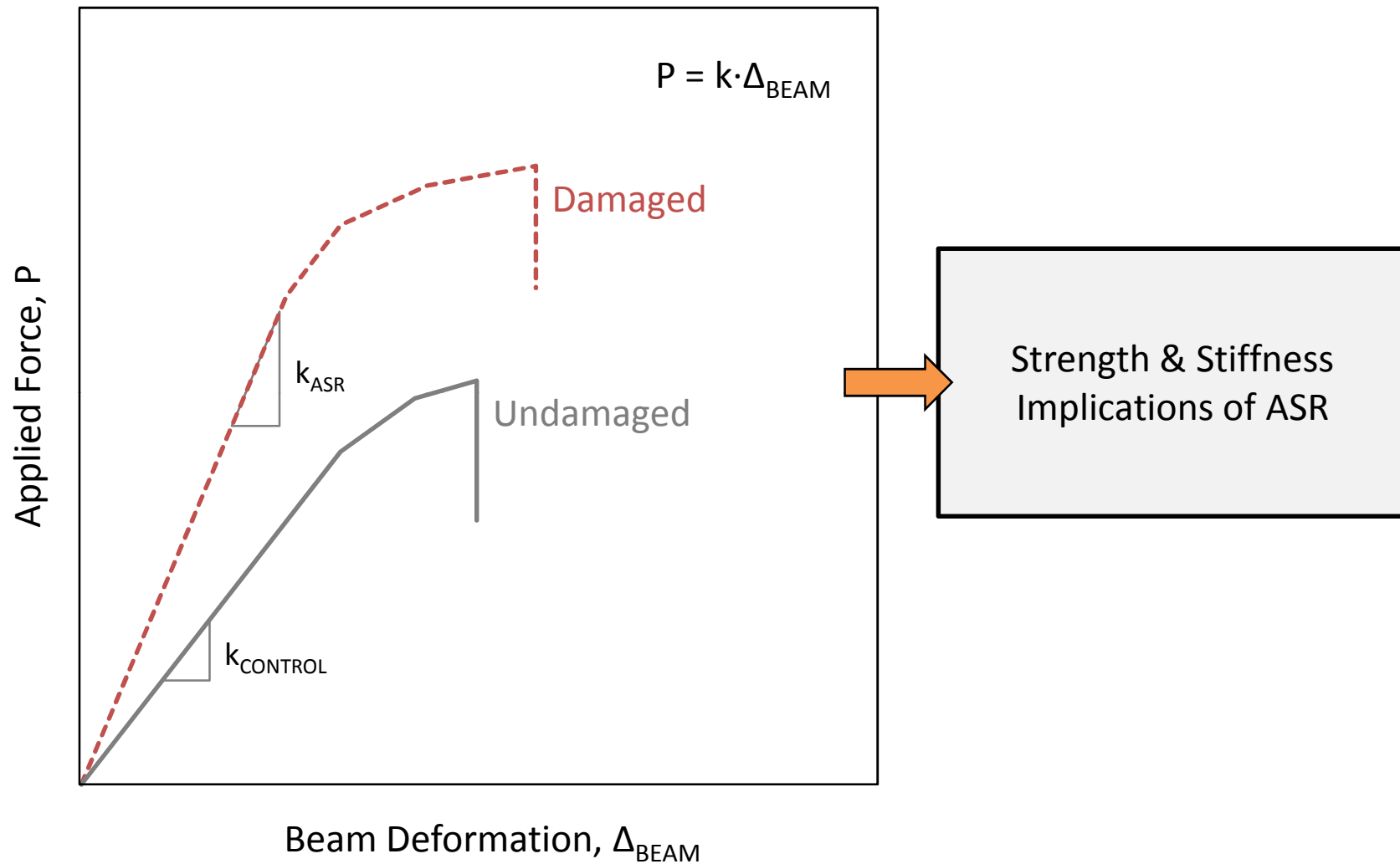


# STRUCTURAL TESTING

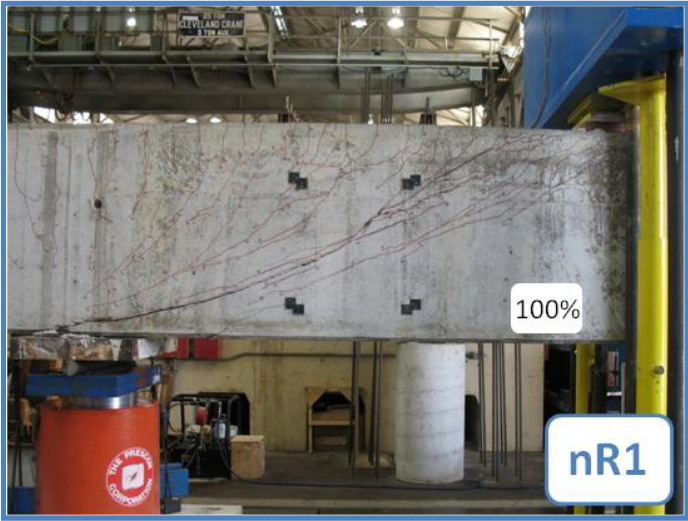
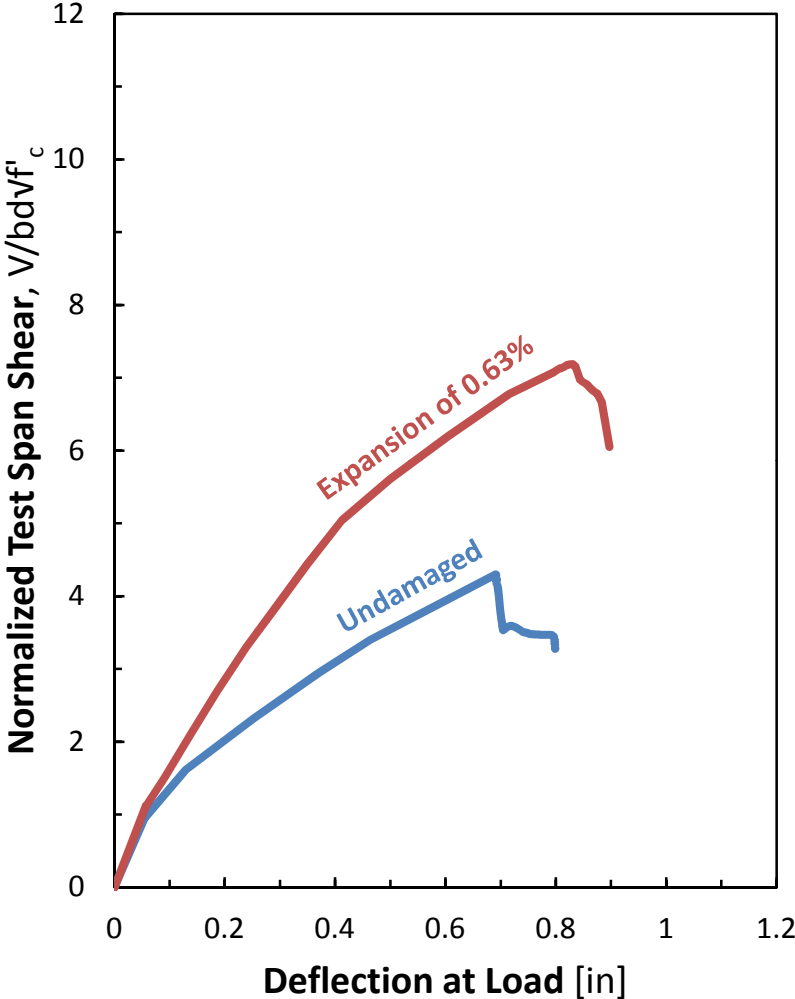




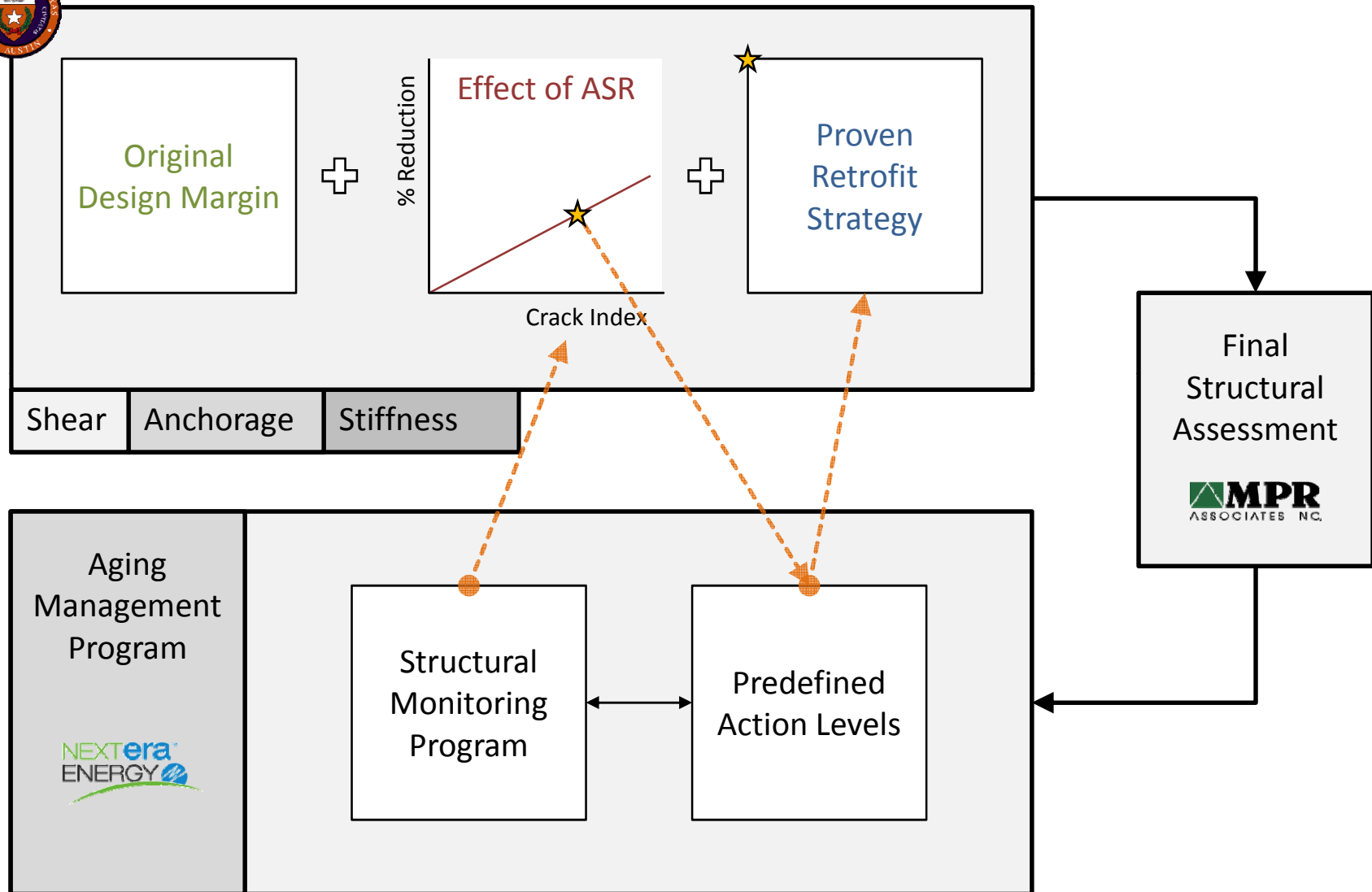
# ANALYSIS OF RESULTS



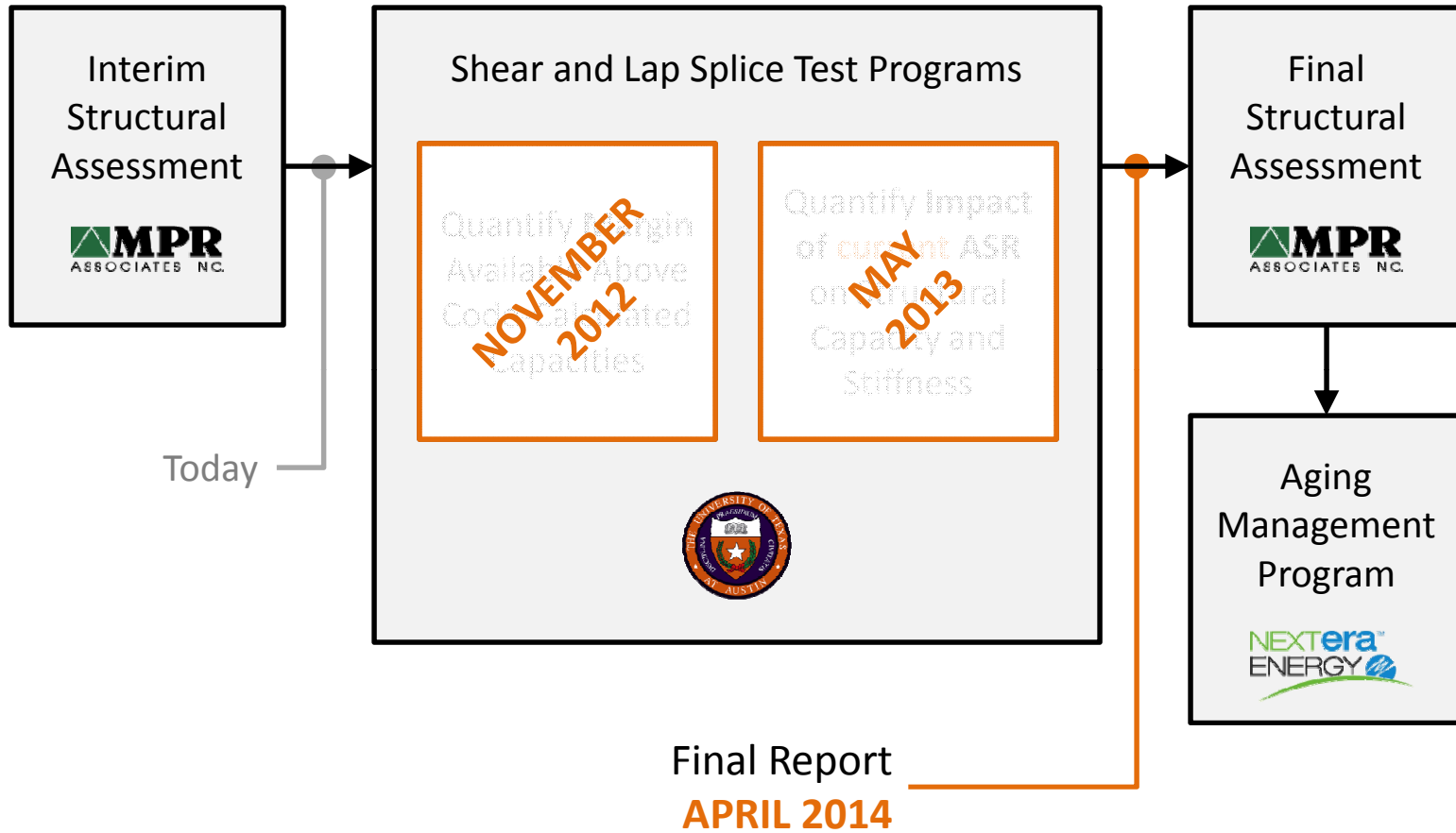
# REPRESENTATIVE RESULTS



# APPLICATION OF RESULTS



# SCHEDULE



Note: Ambient conditions may impact development of ASR in test specimens and project schedule

QUESTIONS